THE NITROGENOUS METABOLISM OF THE SCHMITZ BACILLUS

STUDIES IN BACTERIAL METABOLISM. LXIII

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The Schmitz bacillus, so called because it was first isolated and described by an observer by that name,[1] was found on the Roumanian and Salonika fronts in the feces of patients exhibiting the general symptoms of bacillary dysentery. It also appears to have been rather widely disseminated among the British troops in Macedonia. Serologically, the Schmitz bacillus appears to be an entity definitely distinguishable from the Shiga bacillus and the members of the Flexner group of dysentery bacilli. Culturally, it resembles the Shiga bacillus closely, both chemically and morphologically. A point of differentiation between the two appears to be indol formation. The Schmitz bacillus practically always changes tryptophan to indol, whereas the Shiga bacillus has never been reported as inducing noteworthy decomposition of this amino acid. It is quite clear from the meager literature on the Schmitz bacillus that comparatively little is known about it other than the circumstantial evidence surrounding its occurrence in the feces of patients exhibiting a syndrome similar to, or indistinguishable from, mild to severe bacillary dysentery.

Two cultures were available for study, one from the Army Medical School, the other from the laboratory of Dr. Andrewes in England. As they agreed culturally and chemically, the details of only one are herewith presented.

A cultural difference between the Shiga bacillus [2] and the Schmitz bacillus is at once discernible. The Shiga bacillus produces a moderate but distinct increase in reaction up to and including the first week of growth, during which time the amount of deamination (ammonia formation) is minimal, and the evidence points to the availability of a nonnitrogenous source of energy during this period. Then the reac-

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[1] Schmitz: München. med. Wchnschr., 1917, 64, p. 1571.

[2] Kendall and Haner: Jour. Infect. Dis., Study LVII, 1922, 30, p. 226.

tion becomes alkaline and the deamination begins. This was tentatively explained as an indication of the utilization of the so-called carbohydrate fraction of the protein molecule for which the Shiga bacillus and the staphylococcus seem to possess a predilection. On the exhaustion of this moiety of the protein constituents of the medium, the attack on the residual nitrogenous portion begins.

The Schmitz bacillus fails to exhibit signs indicative of this utilization of the carbohydrate portion of the protein molecule. Indeed, the

TABLE 1

BACILLUS OF SCHMITZ

Mg. per 100 C c	Control	Day	Plain Broth	Glucose Broth
Total nitrogen	1.080	1	1.080	1.080
Protein nitrogen	0.778		0.811	0.790
Nonprotein nitrogen	0.302		0.269	0.290
Polypeptid nitrogen	0.210		0.170	0.198
Amino nitrogen	0.042		0.044	0.042
Ammonia nitrogen	0.050		0.055	0.050
Reaction	+0.80		+1.40	+3.80
P_H	7.2		6.9	5.8
Total nitrogen	1.080	4	1.080	1.080
Protein nitrogen	0.778		0.822	0.812
Nonprotein nitrogen	0.302		0.258	0.268
Polypeptid nitrogen	0.210		0.156	0.166
Amino nitrogen	0.042		0.044	0.052
Ammonia nitrogen	0.050		0.058	0.050
Reaction	+0.80		+0.80	+5.10
P_H	7.2		7.1	5.3
Total nitrogen	1.080	7	1.080	1.080
Protein nitrogen	0.778		0.879	0.890
Nonprotein nitrogen	0.302		0.201	0.190
Polypeptid nitrogen	0.210		0.088	0.098
Amino nitrogen	0.042		0.051	0.042
Ammonia nitrogen	0.050		0.062	0.050
Reaction	+0.80		−0.80	+5.00
P_H	7.2		7.8	5.0
Total nitrogen	1.080	10	1.080	1.080
Protein nitrogen	0.778		0.856	0.857
Nonprotein nitrogen	0.302		0.224	0.223
Polypeptid nitrogen	0.210		0.121	0.135
Amino nitrogen	0.042		0.037	0.040
Ammonia nitrogen	0.050		0.066	0.048
Reaction	+0.80		−1.50	+4.80
P_H	7.2		8.5	5.3

growth suggests strongly that of the typhoid bacillus in intensity of action on the protein constituents of plain gelatin. In glucose gelatin the sparing action of utilizable carbohydrate for protein is clearly indicated through the practical absence of deamination. These observations on the nitrogenous changes in plain gelatin cultures of the Schmitz bacillus are in accord with the known facts, namely, that the organism is clearly distinguishable from the Shiga bacillus, both

serologically and because the former induces deeper seated changes in specific constituents of the nitrogenous cultural medium.

With respect to indol formation, the Schmitz bacillus resembles more closely the members of the dysentery group of the Flexner type than the Shiga type. On the other hand, the inability of the Schmitz bacillus to ferment mannitol separates it sharply from the Flexner types and places it with the Shiga type in so far as the relationship between the cytoplasm of the microbes and the stereo-configuration of the carbohydrates utilizable for energy is concerned. The available evidence suggests that the Schmitz bacillus is a distinct member of the dysentery group but not a variant of the Shiga bacillus.